



HAZARDOUS SUBSTANCE FACT SHEET

Common Name: **ETHYLENEIMINE**

CAS Number: 151-56-4

DOT Number: UN 1185

RTK Substance number: 0881

Date: April 1997

Revision: March 2004

HAZARD SUMMARY

- * **Ethyleneimine** can affect you when breathed in and by passing through your skin.
- * **Ethyleneimine** should be handled as a **CARCINOGEN--WITH EXTREME CAUTION**.
- * **Ethyleneimine** may damage the developing fetus.
- * Contact can severely irritate and burn the skin and eyes with possible eye damage.
- * Breathing **Ethyleneimine** can irritate the nose and throat.
- * Breathing **Ethyleneimine** can irritate the lungs causing coughing and/or shortness of breath. Higher exposures can cause a build-up of fluid in the lungs (pulmonary edema), a medical emergency, with severe shortness of breath.
- * **Ethyleneimine** may cause a skin allergy. If allergy develops, very low future exposure can cause itching and a skin rash.
- * **Ethyleneimine** may damage the liver and kidneys.
- * **Ethyleneimine** is a **FLAMMABLE** and **REACTIVE** chemical and a **FIRE** and **EXPLOSION HAZARD**.

IDENTIFICATION

Ethyleneimine is a clear, colorless liquid with the odor of *Ammonia*. It is used as an intermediate and monomer for fuel oil and lubricant refining.

REASON FOR CITATION

- * **Ethyleneimine** is on the Hazardous Substance List because it is regulated by OSHA and cited by ACGIH, DOT, NIOSH, DEP, IARC, IRIS, NFPA and EPA.
- * This chemical is on the Special Health Hazard Substance List because it is a **CARCINOGEN** and is **FLAMMABLE** and **REACTIVE**.
- * Definitions are provided on page 5.

HOW TO DETERMINE IF YOU ARE BEING EXPOSED

The New Jersey Right to Know Act requires most employers to label chemicals in the workplace and requires public employers to provide their employees with information and training concerning chemical hazards and controls. The federal OSHA Hazard Communication Standard, 1910.1200, requires private employers to provide similar training and information to their employees.

- * Exposure to hazardous substances should be routinely evaluated. This may include collecting personal and area

air samples. You can obtain copies of sampling results from your employer. You have a legal right to this information under OSHA 1910.1020.

- * If you think you are experiencing any work-related health problems, see a doctor trained to recognize occupational diseases. Take this Fact Sheet with you.
- * **ODOR THRESHOLD = 0.68 to 2 ppm.**
- * The range of accepted odor threshold values is quite broad. Caution should be used in relying on odor alone as a warning of potentially hazardous exposures.

WORKPLACE EXPOSURE LIMITS

OSHA: No exposure limits have been established by OSHA for **Ethyleneimine**. Please refer to the OSHA Standards: 29 CFR 1910.1003 and 1910.1012.

NIOSH: Recommends that exposure to occupational carcinogens be limited to the lowest feasible concentration.

ACGIH: The recommended airborne exposure limit is **0.5 ppm** averaged over an 8-hour workshift.

- * **Ethyleneimine** may be a **CARCINOGEN** in humans. There may be no safe level of exposure to a carcinogen, so all contact should be reduced to the lowest possible level.
- * The above exposure limits are for air levels only. When skin contact also occurs, you may be overexposed, even though air levels are less than the limits listed above.

WAYS OF REDUCING EXPOSURE

- * Enclose operations and use local exhaust ventilation at the site of chemical release. If local exhaust ventilation or enclosure is not used, respirators should be worn.
- * A regulated, marked area should be established where **Ethyleneimine** is handled, used, or stored as required by the OSHA Standards: 29 CFR 1910.1003 and 1910.1012.
- * Wear protective work clothing.
- * Wash thoroughly immediately after exposure to **Ethyleneimine** and at the end of the workshift.
- * Post hazard and warning information in the work area. In addition, as part of an ongoing education and training effort, communicate all information on the health and safety hazards of **Ethyleneimine** to potentially exposed workers.

This Fact Sheet is a summary source of information of all potential and most severe health hazards that may result from exposure. Duration of exposure, concentration of the substance and other factors will affect your susceptibility to any of the potential effects described below.

HEALTH HAZARD INFORMATION

Acute Health Effects

The following acute (short-term) health effects may occur immediately or shortly after exposure to **Ethyleneimine**:

- * Contact can severely irritate and burn the skin and eyes with possible eye damage.
- * Breathing **Ethyleneimine** can irritate the nose and throat.
- * Breathing **Ethyleneimine** can irritate the lungs causing coughing and/or shortness of breath. Higher exposures can cause a build-up of fluid in the lungs (pulmonary edema), a medical emergency, with severe shortness of breath.

Chronic Health Effects

The following chronic (long-term) health effects can occur at some time after exposure to **Ethyleneimine** and can last for months or years:

Cancer Hazard

- * **Ethyleneimine** may be a CARCINOGEN in humans since it has been shown to cause lung, liver and lymph gland cancers in animals.
- * Many scientists believe there is no safe level of exposure to a carcinogen.

Reproductive Hazard

- * **Ethyleneimine** may damage the developing fetus.
- * **Ethyleneimine** may damage the testes (male reproductive glands).

Other Long-Term Effects

- * **Ethyleneimine** can irritate the lungs. Repeated exposure may cause bronchitis to develop with cough, phlegm, and/or shortness of breath.
- * **Ethyleneimine** may cause a skin allergy. If allergy develops, very low future exposure can cause itching and a skin rash.
- * **Ethyleneimine** may damage the liver and kidneys.

MEDICAL

Medical Testing

Before beginning employment and at regular times after that, for those with frequent or potentially high exposures, the following are recommended:

- * Lung function tests.

If symptoms develop or overexposure is suspected, the following are recommended:

- * Consider chest x-ray after acute overexposure.
- * Evaluation by a qualified allergist, including careful exposure history and special testing, may help diagnose skin allergy.
- * Liver and kidney function tests.

Any evaluation should include a careful history of past and present symptoms with an exam. Medical tests that look for damage already done are not a substitute for controlling exposure.

Request copies of your medical testing. You have a legal right to this information under OSHA 1910.1020.

Mixed Exposures

- * Because smoking can cause heart disease, as well as lung cancer, emphysema, and other respiratory problems, it may worsen respiratory conditions caused by chemical exposure. Even if you have smoked for a long time, stopping now will reduce your risk of developing health problems.
- * Because more than light alcohol consumption can cause liver damage, drinking alcohol can increase the liver damage caused by **Ethyleneimine**.

WORKPLACE CONTROLS AND PRACTICES

Unless a less toxic chemical can be substituted for a hazardous substance, **ENGINEERING CONTROLS** are the most effective way of reducing exposure. The best protection is to enclose operations and/or provide local exhaust ventilation at the site of chemical release. Isolating operations can also reduce exposure. Using respirators or protective equipment is less effective than the controls mentioned above, but is sometimes necessary.

In evaluating the controls present in your workplace, consider: (1) how hazardous the substance is, (2) how much of the substance is released into the workplace and (3) whether harmful skin or eye contact could occur. Special controls should be in place for highly toxic chemicals or when significant skin, eye, or breathing exposures are possible.

In addition, the following controls are recommended:

- * Where possible, automatically pump liquid **Ethyleneimine** from drums or other storage containers to process containers.
- * Specific engineering controls are required for this chemical by OSHA. Refer to the OSHA Standards on **Ethyleneimine**: 29 CFR 1910.1003 and 1910.1012.
- * Before entering a confined space where **Ethyleneimine** may be present, check to make sure that an explosive concentration does not exist.

Good **WORK PRACTICES** can help to reduce hazardous exposures. The following work practices are recommended:

- * Workers whose clothing has been contaminated by **Ethyleneimine** should change into clean clothing promptly.
- * Do not take contaminated work clothes home. Family members could be exposed.
- * Contaminated work clothes should be laundered by individuals who have been informed of the hazards of exposure to **Ethyleneimine**.
- * Eye wash fountains should be provided in the immediate work area for emergency use.
- * If there is the possibility of skin exposure, emergency shower facilities should be provided.
- * On skin contact with **Ethyleneimine**, immediately wash or shower to remove the chemical. At the end of the workshift, wash any areas of the body that may have contacted **Ethyleneimine**, whether or not known skin contact has occurred.
- * Do not eat, smoke, or drink where **Ethyleneimine** is handled, processed, or stored, since the chemical can be swallowed. Wash hands carefully before eating, drinking, smoking, or using the toilet.

PERSONAL PROTECTIVE EQUIPMENT

WORKPLACE CONTROLS ARE BETTER THAN PERSONAL PROTECTIVE EQUIPMENT. However, for some jobs (such as outside work, confined space entry, jobs done only once in a while, or jobs done while workplace controls are being installed), personal protective equipment may be appropriate.

OSHA 1910.132 requires employers to determine the appropriate personal protective equipment for each hazard and to train employees on how and when to use protective equipment.

The following recommendations are only guidelines and may not apply to every situation.

Clothing

- * Avoid skin contact with **Ethyleneimine**. Wear protective gloves and clothing. Safety equipment suppliers/manufacturers can provide recommendations on the most protective glove/clothing material for your operation.
- * All protective clothing (suits, gloves, footwear, headgear) should be clean, available each day, and put on before work.
- * Safety equipment manufacturers recommend *Butyl Rubber* as a protective material.

Eye Protection

- * Wear indirect-vent, impact and splash resistant goggles when working with liquids.
- * Wear a face shield along with goggles when working with corrosive, highly irritating or toxic substances.
- * Contact lenses should not be worn when working with this substance.

Respiratory Protection

IMPROPER USE OF RESPIRATORS IS DANGEROUS. Such equipment should only be used if the employer has a written program that takes into account workplace conditions, requirements for worker training, respirator fit testing and medical exams, as described in OSHA 1910.134.

- * Where the potential exists for exposure over **0.5 ppm**, use a NIOSH approved supplied-air respirator with a full facepiece operated in a pressure-demand or other positive-pressure mode. For increased protection use in combination with an auxiliary self-contained breathing apparatus operated in a pressure-demand or other positive-pressure mode.
- * Exposure to **100 ppm** is immediately dangerous to life and health. If the possibility of exposure above **100 ppm** exists, use a NIOSH approved self-contained breathing apparatus with a full facepiece operated in a pressure-demand or other positive-pressure mode equipped with an emergency escape air cylinder.

HANDLING AND STORAGE

- * Prior to working with **Ethyleneimine** you should be trained on its proper handling and storage.
- * A regulated, marked area should be established where **Ethyleneimine** is handled, used, or stored.
- * Explosive polymerization may occur when *uninhibited* **Ethyleneimine** is exposed to SUNLIGHT; HEAT; OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); and STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC).
- * **Ethyleneimine** may react with WATER to release heat.
- * **Ethyleneimine** is not compatible with SODIUM HYPOCHLORITE; CARBON DIOXIDE; METALS; HALOGENATED HYDROCARBONS; and COMBUSTIBLES.
- * Store in tightly closed containers in a cool, well-ventilated area.
- * Sources of ignition, such as smoking and open flames, are prohibited where **Ethyleneimine** is used, handled, or stored.
- * Metal containers involving the transfer of **Ethyleneimine** should be grounded and bonded.
- * Use only non-sparking tools and equipment, especially when opening and closing containers of **Ethyleneimine**.
- * Wherever **Ethyleneimine** is used, handled, manufactured, or stored, use explosion-proof electrical equipment and fittings.

QUESTIONS AND ANSWERS

- Q: If I have acute health effects, will I later get chronic health effects?
- A: Not always. Most chronic (long-term) effects result from repeated exposures to a chemical.

- Q: Can I get long-term effects without ever having short-term effects?
- A: Yes, because long-term effects can occur from repeated exposures to a chemical at levels not high enough to make you immediately sick.
- Q: What are my chances of getting sick when I have been exposed to chemicals?
- A: The likelihood of becoming sick from chemicals is increased as the amount of exposure increases. This is determined by the length of time and the amount of material to which someone is exposed.
- Q: When are higher exposures more likely?
- A: Conditions which increase risk of exposure include physical and mechanical processes (heating, pouring, spraying, spills and evaporation from large surface areas such as open containers), and "confined space" exposures (working inside vats, reactors, boilers, small rooms, etc.).
- Q: Is the risk of getting sick higher for workers than for community residents?
- A: Yes. Exposures in the community, except possibly in cases of fires or spills, are usually much lower than those found in the workplace. However, people in the community may be exposed to contaminated water as well as to chemicals in the air over long periods. This may be a problem for children or people who are already ill.
- Q: Don't all chemicals cause cancer?
- A: No. Most chemicals tested by scientists are not cancer-causing.
- Q: Should I be concerned if a chemical causes cancer in animals?
- A: Yes. Most scientists agree that a chemical that causes cancer in animals should be treated as a suspected human carcinogen unless proven otherwise.
- Q: But don't they test animals using much higher levels of a chemical than people usually are exposed to?
- A: Yes. That's so effects can be seen more clearly using fewer animals. But high doses alone don't cause cancer unless it's a cancer agent. In fact, a chemical that causes cancer in animals at high doses could cause cancer in humans exposed to low doses.
- Q: Can men as well as women be affected by chemicals that cause reproductive system damage?
- A: Yes. Some chemicals reduce potency or fertility in both men and women. Some damage sperm and eggs, possibly leading to birth defects.
- Q: Who is at the greatest risk from reproductive hazards?
- A: Pregnant women are at greatest risk from chemicals that harm the developing fetus. However, chemicals may affect the ability to have children, so both men and women of childbearing age are at high risk.

The following information is available from:

New Jersey Department of Health and Senior Services
Occupational Health Service
PO Box 360
Trenton, NJ 08625-0360
(609) 984-1863
(609) 984-7407 (fax)

Web address: <http://www.state.nj.us/health/eoh/odisweb/>

Industrial Hygiene Information

Industrial hygienists are available to answer your questions regarding the control of chemical exposures using exhaust ventilation, special work practices, good housekeeping, good hygiene practices, and personal protective equipment including respirators. In addition, they can help to interpret the results of industrial hygiene survey data.

Medical Evaluation

If you think you are becoming sick because of exposure to chemicals at your workplace, you may call personnel at the Department of Health and Senior Services, Occupational Health Service, who can help you find the information you need.

Public Presentations

Presentations and educational programs on occupational health or the Right to Know Act can be organized for labor unions, trade associations and other groups.

Right to Know Information Resources

The Right to Know Infoline (609) 984-2202 can answer questions about the identity and potential health effects of chemicals, list of educational materials in occupational health, references used to prepare the Fact Sheets, preparation of the Right to Know Survey, education and training programs, labeling requirements, and general information regarding the Right to Know Act. Violations of the law should be reported to (609) 984-2202.

The **vapor pressure** is a measure of how readily a liquid or a solid mixes with air at its surface. A higher vapor pressure indicates a higher concentration of the substance in air and therefore increases the likelihood of breathing it in.

FOR LARGE SPILLS AND FIRES immediately call your fire department. You can request emergency information from the following:

CHEMTREC: (800) 424-9300
NJDEP HOTLINE: 1-877-WARN-DEP

Hazard Rating Key: 0=minimal; 1=slight; 2=moderate; 3=serious; 4=severe

HANDLING AND STORAGE (See page 3)

FIRST AID

For POISON INFORMATION call 1-800-222-1222

Eye Contact

- * Immediately flush with large amounts of water. Continue without stopping for at least 45 minutes, occasionally lifting upper and lower lids. Seek medical attention immediately.

Skin Contact

- * Quickly remove contaminated clothing. Immediately wash area with large amounts of soap and water. Seek medical attention immediately.

Breathing

- * Remove the person from exposure.
- * Begin rescue breathing (using universal precautions) if breathing has stopped and CPR if heart action has stopped.
- * Transfer promptly to a medical facility.
- * Medical observation is recommended for 24 to 48 hours after breathing overexposure, as pulmonary edema may be delayed.

SPILLS AND EMERGENCIES

If **Ethyleneimine** is spilled or leaked, take the following steps:

- * Evacuate persons not wearing protective equipment from area of spill or leak until clean-up is complete.
- * Remove all sources of ignition.
- * Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers.
- * Ventilate and wash area after clean-up is complete.
- * Keep **Ethyleneimine** out of a confined space, such as a sewer, because of the possibility of an explosion, unless the sewer is designed to prevent the build-up of explosive concentrations.
- * It may be necessary to contain and dispose of **Ethyleneimine** as a HAZARDOUS WASTE. Contact your state Department of Environmental Protection (DEP) or your regional office of the federal Environmental Protection Agency (EPA) for specific recommendations.
- * If employees are required to clean-up spills, they must be properly trained and equipped. OSHA 1910.120(q) may be applicable.

PHYSICAL DATA

Vapor Pressure: 160 mm Hg at 68°F (20°C)

Flash Point: 12°F (-11°C)

Water Solubility: Miscible (mixes in water)

OTHER COMMONLY USED NAMES

Chemical Name:

Aziridine

Other Names:

Aminoethylene; Azirane; Dimethyleneimine

Not intended to be copied and sold for commercial purposes.

NEW JERSEY DEPARTMENT OF HEALTH AND
SENIOR SERVICES

Right to Know Program

PO Box 368, Trenton, NJ 08625-0368
(609) 984-2202